
BULLETIN

of the

Chicago Herpetological Society



Volume 50, Number 10
October 2015



BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY

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Cover: Arizona mountain kingsnakes, *Lampropeltis pyromelana pyromelana*, from the vicinity of Prescott, Arizona. Photograph by Stephen L. Barten, D.V.M.

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The Bulletin of the Chicago Herpetological Society (ISSN 0009-3564) is published monthly by the Chicago Herpetological Society, 2430 N. Cannon Drive, Chicago IL 60614. Periodicals postage paid at Chicago IL. **Postmaster:** Send address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago IL 60614.

Synopsis of Chiggers Parasitic on North American Amphibians

Dreux J. Watermolen
Wisconsin Department of Natural Resources
PO Box 7921
Madison, WI 53707-7921

Abstract

At least 17 species of chiggers (Acarina: Trombiculidae and Leeuwenhoekiidae) have been reported as parasites of 21 species of salamander (three families) and 41 species of frog (seven families) in North America. Although not frequently reported, these parasites may be more widespread than previously thought and may significantly impact the health and viability of their host species. Here, I provide a brief overview of these parasites and their effects. The summary includes a host-parasite list with up-to-date taxonomic nomenclature and information on geographic distribution.

Introduction

Wildlife health and conservation biology practitioners are increasingly concerned about the potential impacts that parasites can have on the fitness of their hosts. Amphibians serve as hosts for a variety of parasites, ranging from microorganisms to helminths to arthropods (Bardsley and Harmsen, 1973; Prudhoe and Bray, 1982; Baker, 1987; Dyer, 1991; McAlpine, 1996; Sutherland, 2005; Duszynski et al., 2007). The effects of most parasite species on the health and reproduction of amphibians, however, remain largely uninvestigated and, as a result, largely unknown (i.e., many parasites have never been linked with any disease conditions in their hosts). In this short note, I review the available literature and tabulate records of chiggers (parasitic larval mites) from North American amphibians, a group for which relatively little has been published. The summary includes a host-parasite list with up-to-date taxonomic nomenclature for the amphibians and information on the geographic distribution of the records. The list includes several host and geographic records missed in previous compilations and corrects names and distribution information previously reported in error.

Chigger Parasites

Chiggers are minute larval “harvest mites” that occur primarily as short-term ectoparasites on vertebrate, and occasionally arthropod, hosts. Only the larval stage is parasitic. Most simply attach to their hosts’ skin, but some become completely embedded within the integument. Hyland (1950, 1961) and Hyland and Wharton (1955) detailed the feeding behavior of intradermal *Hannemania* spp. Once a mite chooses an attachment site, it inserts its chelicerae into the epithelium and burrows until it is completely within the integument. When applied experimentally to a host, unengorged larvae penetrate and become embedded within a couple of hours (Hyland, 1950). A subcutaneous cyst forms around the chigger, completely enclosing it. The parasite’s presence is indicated by a red, orange, or yellowish pustule about 1 mm in diameter at the site of each mite.

Larvae are believed to feed by secreting histolytic enzymes into the host tissue and ingesting the predigested tissues. Mites can remain embedded for more than six months (Hyland, 1950, 1961). When fully engorged, they detach from the host. If the host dies, the larvae actively emerge from the skin (Hyland, 1950). A quiescent stage (protonymph) follows detachment. Following

a molt, the sexually immature nymph (deutonymph) emerges with eight legs. The deutonymph then passes through another quiescent stage (tritonymph) before molting into an eight-legged adult. The nymphs and adults are free-living. Nymphs may or may not feed, while adults are predators on tiny insects and insect eggs. They may also consume plant matter. The nymphs and adults of most chiggers have rarely been observed and are underrepresented in museum collections. As a result, the taxonomy of chiggers is based almost entirely on larval forms.

Although some chiggers are encountered frequently on certain hosts, they are not host specific. Rather, chiggers are microhabitat specific (Kudryashova, 1998; Shatrov and Kudryashova, 2008), being found most often on a particular host because their habitat is near that host’s nest, burrow, etc. Most, if not all, other hosts in the same habitat may also be infested by the same species of chigger. In addition, more than a single chigger species may occur on a given host (Radford, 1954; Welbourn and Loomis, 1970).

Most chiggers are reported primarily from bird or mammal hosts (Walters et al., 2011). Reptiles are important hosts for some species. For example, Jenkins (1948) reports eastern indigo snakes (*Drymarchon couperi*) and eastern yellow-bellied racers (*Coluber constrictor flaviventris*) with infestations of 10,000 to 20,000 engorged *Eutrombicula* larvae, and box turtles (*Terrapene carolina*) with 500 chiggers on the neck and legs. Amphibians may also carry significant parasite loads, both in terms of the number of parasites and the frequency of infestation. Loomis (1956) reports collecting a northern leopard frog (*Lithobates pipiens*) with more than 100 *Hannemania* larvae embedded in its skin. He also notes the presence of “many scars where engorged larvae had recently emerged.” Winter et al. (1986) report that 100% (n = 29) of Rich Mountain salamanders (*Plethodon ouachitae*) examined in their study were infested with an average of 20 chiggers. In that same study, Ouachita dusky salamanders (*Desmognathus brimleyorum*) had an average of 21 chiggers, distributed almost entirely on the feet. Murphy (1965) reports pickerel frogs (*L. palustris*) infested by larvae of *Hannemania dunni* with annual frequencies of up to 90% in a North Carolina pond, and Shoemaker and Clark (1975) report that about 90% of northern two-lined salamanders (*Eurycea bislineata*) in a West Virginia creek were infested. In some locations, sympatric species of plethodontid salamanders

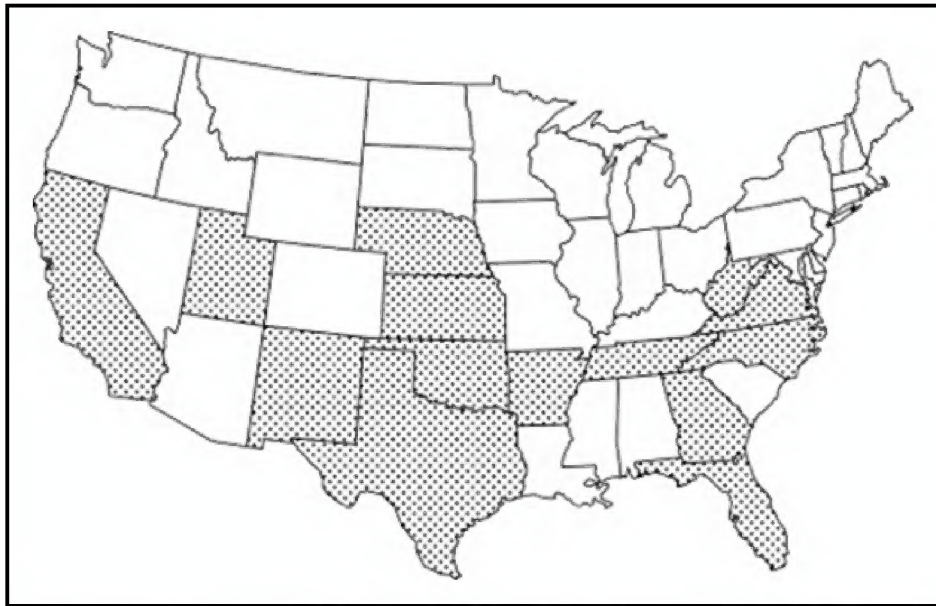


Figure 1. U.S. states from which chiggers have been reported as amphibian parasites. See Table 1 for records and literature citations.

appear to be differentially parasitized, with some species having few or no parasites (e.g., *P. glutinosus* and *P. serratus*) and others (*P. ouachitae*, *P. fourchensis*, and *P. caddoensis*) carrying substantial parasite burdens (Pope and Pope, 1951; Duncan and Highton, 1979; Winter et al., 1986; McAllister et al., 2002).

Chigger infestations may affect the individual fitness of the hosts. For example, parasitized salamanders have been found to be inferior competitors for territories and food resources (Maksimowich and Mathis, 2000). Anthony et al. (1994) present histological evidence of chigger-induced damage to the nasolabial groove in plethodontids. Olfactory cues play a role in the foraging (David and Jaeger, 1981), enemy recognition (Jaeger, 1981), and social and sexual behaviors (Dawley, 1984; Mathis, 1990) of these salamanders. Reduced chemosensory capability resulting from damage to the nasolabial groove could affect these behaviors. In addition, olfactory cues may be important in detection of parasite loads or other aspects of body condition in conspecifics. Nonparasitized female salamanders prefer males that also have low parasite loads (Maksimowich and Mathis, 2001). Winter et al. (1986) noted that in some individual *D. brimleyorum* severe infestation of the appendages resulted in tissue destruction and loss of toes. Chiggers also cause skin irritations and severe itching in their hosts and may serve as vectors of potentially pathogenic microorganisms.

Historically chiggers were placed in the single large family Trombiculidae. Biologists now generally consider them to belong to two families, Trombiculidae and Leeuwenhoeikiidae. There are 12 genera currently recognized in the Leeuwenhoeikiidae and 35 in the Trombiculidae in North America north of Mexico (Walters et al., 2011). Helpful identification aids include a key to chigger genera by Brennan and Goff (1977) and

keys to North American species by Brennan and Jones (1959). Hoffmann (1990) provides keys to the species occurring in Mexico. Goff et al. (1982) present a useful glossary of chigger terminology, and Goff et al. (1986) provide a comprehensive bibliography of works addressing the group. Walters et al. (2011) tabulate host records for North American chiggers.

Chiggers from Amphibians

Table 1 presents a comprehensive host-parasite checklist for species reported from North American amphibians through the end of 2014. Chigger names are preceded by an “L” or “T” indicating the family to which the species belong. At least 17 species of chiggers have been reported as parasites of at least 21 species of salamander (three families) and 41 species of frog (seven families) in the United States and Mexico. Not surprisingly, the northern leopard frog (*Lithobates pipiens*) is the most frequently reported host. Leopard frogs are widely distributed, easily collected, and frequently used as a laboratory animal. This species also hosts the largest number of chigger species (11).

Members of only three chigger genera are recorded from amphibian hosts. Nearly all species in the genus *Hannemania* are reported exclusively from amphibians (Wharton and Fuller, 1952; Goff, 1989; Walters et al., 2011). Loomis (1956) lists *H. penetrans* as a synonym of *H. dunni*, and Hyland (1956) suggests the same. Walters et al. (2011), however, treat *H. penetrans* as a distinct species. A similar situation exists with *H. multifemorala*, which Hyland (1961) considered a synonym of *H. hegneri*. I have made no attempts to sort out these inconsistencies and report the species of *Hannemania* as the cited authors did. As a result, what are reported as records for two different chigger species in these cases may actually apply to only a single species. *Eutrombicula* and *Trombicula* spp. are known from a variety of reptiles, birds, and mammals, as well as amphibians (Radford, 1954; Loomis, 1956; Walters et al., 2011).

The geographic location for each report is indicated. The U.S. records of chiggers from amphibian hosts come from 14 states (Figure 1). In most cases, the ranges of both hosts and parasites are broader than this information may suggest. Chiggers occur mostly throughout the Southeast, South and Midwest. The relatively small number of states and the fact that some states are represented by only one or a very few records suggests that there is much yet to be learned about these organisms.

Acknowledgment

I thank Michele Voss, Wisconsin Department of Natural Resources, for help in preparing the map in Figure 1.

Table 1. Host-parasite list with geographic distribution and literature citations.

Bufonidae
Dwarf American Toad (<i>Anaxyrus americanus charlesmithi</i>)
L: <i>Hannemania dunni</i> – Oklahoma: McAllister and Durden, 2014
Great Plains Toad (<i>Anaxyrus cognatus</i>)
L: <i>Hannemania penetrans</i> – Oklahoma: Kuntz, 1941
L: <i>Hannemania</i> sp. – New Mexico: Duszynski and Jones, 1973

Table 1 (cont'd).

Green Toad (<i>Anaxyrus debilis</i>) L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973
Fowler’s Toad (<i>Anaxyrus fowleri</i>) L: <i>Hannemania penetrans</i> – North Carolina : Brandt, 1936; Virginia : Campbell, 1968 T: <i>Trombicula irritans</i> – Middle Atlantic States : Ewing, 1929
Arizona Toad (<i>Anaxyrus microscaphus</i>) L: <i>Hannemania hegneri</i> – Utah : Parry and Grundmann, 1965 L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973
Red-spotted Toad (<i>Anaxyrus punctatus</i>) L: <i>Hannemania bufonis</i> – Arizona : Loomis and Welbourn, 1969; California : Loomis and Welbourn, 1969, Welbourn and Loomis, 1975; Texas : Loomis and Welbourn, 1969, Loomis et al., 1972, Loomis and Wrenn, 1973; Utah and Sonora, Mexico : Loomis and Welbourn, 1969 L: <i>Hannemania hegneri</i> – Utah : Parry and Grundmann, 1965 L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973, Grover et al., 1975; Texas : Jung et al., 2001
Texas Toad (<i>Anaxyrus speciosus</i>) L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973
Southern Toad (<i>Anaxyrus terrestris</i>) L: <i>Hannemania multifemoralis</i> – Arkansas : Loomis, 1956 T: <i>Eutrombicula alfreddugesi</i> – eastern United States : Jenkins, 1948, Wharton and Fuller, 1952
Woodhouse’s Toad (<i>Anaxyrus woodhousii</i>) L: <i>Hannemania dunni</i> – Oklahoma : Loomis, 1956 L: <i>Hannemania eltoni</i> - Kansas : Loomis, 1956 L: <i>Hannemania multifemoralis</i> – Kansas and Oklahoma : Loomis, 1956 L: <i>Hannemania penetrans</i> – Oklahoma : Kuntz, 1941 L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973 T: <i>Eutrombicula alfreddugesi</i> – Nebraska : Wolfenbarger, 1952 T: <i>Eutrombicula lipovskyana</i> – Kansas : Loomis, 1956
Sinaloa Toad (<i>Incilius mazatlanensis</i>) L: <i>Hannemania bufonis</i> – Sonora, Mexico : Goldberg et al., 2002 L: <i>Hannemania hylae</i> – Sonora, Mexico : Goldberg et al., 2002
Scaphiopodidae
Couch’s Spadefoot (<i>Scaphiopus couchii</i>) L: <i>Hannemania hylae</i> – Sonora, Mexico : Hoffmann, 1969 L: <i>Hannemania penetrans</i> – Oklahoma : Kuntz, 1941, Kuntz and Self, 1944(?)
Plains Spadefoot (<i>Spea bombifrons</i>) L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973 T: <i>Eutrombicula alfreddugesi</i> – Texas , Mertins et al., 2011 (misidentified as <i>Hannemania</i> sp. by Torrence et al., 2007)
Western Spadefoot (<i>Spea hammondi</i>) L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973
Mexican Spadefoot (<i>Spea multiplicata</i>) T: <i>Eutrombicula alfreddugesi</i> – Texas : Mertins et al., 2011 (misidentified as <i>Hannemania</i> sp. by Torrence et al., 2007)
Microhylidae
Great Plains Narrow-mouthed Toad (<i>Gastrophryne olivacea</i>) L: <i>Hannemania dunni</i> – Texas : Loomis, 1956 L: <i>Hannemania multifemoralis</i> – Texas : Loomis, 1956, Crossley, 1960 L: <i>Hannemania penetrans</i> – Oklahoma : Kuntz, 1941

Table 1 (cont'd).

Leptodactylidae
Spotted Chirping Frog (<i>Eleutherodactylus guttilatus</i>) L: <i>Hannemania hylae</i> – Texas : Loomis et al., 1972, Jung et al., 2001 L: <i>Hannemania</i> sp. – Texas : Lynch, 1970; Coahuila, Guanajuato, Nuevo León, San Luis Potosí and Tamaulipas, Mexico : Lynch, 1970
Long-footed Robber Frog (<i>Eleutherodactylus longipes</i>) L: <i>Hannemania hylae</i> – Queretaro, Mexico : Espino del Castillo et al., 2011
Cliff Chirping Frog (<i>Eleutherodactylus marnockii</i>) L: <i>Hannemania monticola</i> – Texas : Malone and Paredes-León, 2005 L: <i>Hannemania</i> sp. – Texas : Gaige, 1931, Lynch, 1970, Malone and Paredes-León, 2005
Pale Chirping Frog (<i>Eleutherodactylus pallidus</i>) L: <i>Hannemania anurae</i> – Nayarit and Sinaloa, Mexico , Welbourn and Loomis, 1970 L: <i>Hannemania</i> sp. – Nayarit, Mexico : Lynch, 1970
Marbled Robber Frog (<i>Eleutherodactylus saxatilis</i>) L: <i>Hannemania monticola</i> – Durango, Mexico : Welbourn and Loomis, 1970 L: <i>Hannemania saxatilis</i> – Durango, Mexico : Welbourn and Loomis, 1970
Big-eared Chirping Frog (<i>Eleutherodactylus verrucipes</i>) L: <i>Hannemania</i> sp. – Hidalgo, Queretaro and San Luis Potosí, Mexico : Lynch, 1970
Sabinal Frog (<i>Leptodactylus melanonotus</i>) L: <i>Hannemania hylae</i> – Jalisco, Mexico : Jacinto-Maldonado et al., 2013
Craugastoridae
Northern Rain Frog (<i>Craugastor</i> sp.) L: <i>Hannemania hylae</i> – Morelos, Mexico : Hoffmann, 1969
Hylidae
Eastern Cricket Frog (<i>Acris crepitans</i>) L: <i>Hannemania eltoni</i> – Texas : Block, 1968 L: <i>Hannemania hegneri</i> – Georgia : Crossley and Proctor, 1971 L: <i>Hannemania penetrans</i> – Oklahoma : Kuntz, 1941
Southern Cricket Frog (<i>Acris gryllus</i>) L: <i>Hannemania dunni</i> – Kansas and Oklahoma : Loomis, 1956 L: <i>Hannemania eltoni</i> – Kansas : Loomis, 1956, Crossley, 1960 L: <i>Hannemania multifemoralis</i> – Arkansas, Kansas and Oklahoma : Loomis, 1956 T: <i>Eutrombicula alfreddugesi</i> – Kansas : Loomis, 1956 T: <i>Eutrombicula lipovskyana</i> – Kansas : Loomis, 1956
Canyon Treefrog (<i>Hyla arenicolor</i>) L: <i>Hannemania anurae</i> – Nayarit and Sinaloa, Mexico : Welbourn and Loomis, 1970 L: <i>Hannemania hegneri</i> – Utah : Parry and Grundmann, 1965 L: <i>Hannemania hylae</i> – Arizona : Loomis and Welbourn, 1969; California : Ewing, 1925, Ewing, 1926, Ewing, 1931, Radford, 1942, Gould, 1956, Hyland, 1956; Colorado : Finley, 1953; Texas : Loomis and Welbourn, 1969, Loomis et al., 1972, Jung et al., 2001; Utah : Loomis and Welbourn, 1969; Sonora, Mexico : Loomis and Welbourn, 1969 L: <i>Hannemania</i> sp. – New Mexico : Duszynski and Jones, 1973, Grover et al., 1975; North Carolina (zoo animals of uncertain origin) : Sladky et al., 2000
Mountain Treefrog (<i>Hyla eximia</i>) L: <i>Hannemania anurae</i> – Nayarit, Mexico : Welbourn and Loomis, 1970 L: <i>Hannemania monticola</i> – Durango, Mexico : Welbourn and Loomis, 1970
Squirrel Treefrog (<i>Hyla squirella</i>) (?) T: <i>Eutrombicula masoni</i> – Florida : Farner and Seaman, 1946; southeastern United States : Jenkins, 1948

Table 1 (cont'd).

California Treefrog (<i>Pseudacris cadaverina</i>)
L: <i>Hannemania hylae</i> – California : Loomis and Welbourn, 1969, Welbourn and Loomis, 1975; Baja California Norte, Mexico : Loomis and Welbourn, 1969
Spotted Chorus Frog (<i>Pseudacris clarkii</i>)
L: <i>Hannemania</i> sp. – Texas : McAllister, 1991
Ranidae
Rio Grande Leopard Frog (<i>Lithobates berlandieri</i>)
L: <i>Hannemania anurae</i> – Jalisco, Nayarit and Sinaloa, Mexico : Paredes-León et al., 2008
L: <i>Hannemania hylae</i> – Morelos, Mexico : Hoffmann, 1969
L: <i>Hannemania mexicana</i> – San Luis Potosí, Mexico : Hoffmann, 1965; Puebla, Mexico : Paredes-León et al., 2008
L: <i>Hannemania pelaezi</i> – Morelos, Mexico : Paredes-León et al., 2008
L: <i>Hannemania</i> sp. – Texas : Jung et al., 2001 (referred to as an “unidentified new species similar to <i>H. anurae</i> ”)
American Bullfrog (<i>Lithobates catesbeianus</i>)
L: <i>Hannemania penetrans</i> – North Carolina : Brandt, 1936; Oklahoma : Kuntz, 1941; Virginia : Campbell, 1968
Green Frog (<i>Lithobates clamitans</i>)
L: <i>Hannemania dunni</i> – North Carolina : Murphy, 1965; Virginia : Loomis, 1956
L: <i>Hannemania penetrans</i> – Virginia : Ewing, 1931, Hyland, 1956, Campbell, 1968
Forrer’s Grass Frog (<i>Lithobates forreri</i>)
L: <i>Hannemania</i> sp. – Mexico, Mexico : Monroy-Vilchis et al., 2015
Moore’s Frog (<i>Lithobates johnei</i>)
L: <i>Hannemania mexicana</i> – San Luis Potosí, Mexico : Hoffmann, 1965, Hoffmann, 1969
Montezuma Leopard Frog (<i>Lithobates montezumae</i>)
L: <i>Hannemania anurae</i> – Jalisco, Mexico : Welbourn and Loomis, 1970
Pickerel Frog (<i>Lithobates palustris</i>)
L: <i>Hannemania dunni</i> – North Carolina : Murphy, 1965; Virginia : Loomis, 1956
L: <i>Hannemania hegneri</i> – laboratory experiment : Hyland, 1961 (referred to as “green frog”)
L: <i>Hannemania</i> sp. – Arkansas : McAllister, Trauth and Bursey, 1995b
T: <i>Eutrombicula alfreddugesi</i> – eastern United States : Jenkins, 1948, Wharton and Fuller, 1952
Northern Leopard Frog (<i>Lithobates pipiens</i>)
L: <i>Hannemania anurae</i> – Jalisco, Nayarit and Sinaloa, Mexico : Welbourn and Loomis, 1970
L: <i>Hannemania dunni</i> – Oklahoma : Loomis, 1956
L: <i>Hannemania eltoni</i> – Kansas : Loomis, 1956, Crossley, 1960; Texas : Hyland, 1956, Loomis, 1956, Crossley, 1960
L: <i>Hannemania hegneri</i> – Georgia : Crossley and Proctor, 1971; Utah : Parry and Grundmann, 1965; laboratory experiment : Hyland, 1961
L: <i>Hannemania hylae</i> – Morelos, Mexico : Hoffmann, 1969
L: <i>Hannemania mexicana</i> – Texas : Loomis et al., 1972, Loomis and Wrenn, 1973; San Luis Potosí, Mexico : Hoffmann, 1965, Hoffmann, 1969
L: <i>Hannemania multifemorala</i> – Arkansas, Kansas and Missouri : Loomis, 1956; Nebraska : Loomis, 1956, Crossley, 1960; Oklahoma and Texas : Loomis, 1956
L: <i>Hannemania pelaezi</i> – Morelos, Mexico : Hoffmann, 1965, Hoffmann, 1969
L: <i>Hannemania penetrans</i> – Oklahoma : Kuntz, 1941; Virginia : Ewing, 1931, Radford, 1942
L: <i>Hannemania</i> sp. – New Mexico : Grover et al., 1975
T: <i>Eutrombicula alfreddugesi</i> – eastern United States : Jenkins, 1948, Wharton and Fuller, 1952; Kansas : Loomis, 1956; Mexico : Hoffmann, 1969
T: <i>Eutrombicula lipovskyana</i> – Kansas : Loomis, 1956
White-striped Frog (<i>Lithobates pustulosus</i>)
L: <i>Hannemania anurae</i> – Sinaloa, Mexico : Welbourn and Loomis, 1970

Table 1 (cont'd).

Southern Leopard Frog (<i>Lithobates sphenoccephalus</i>) L: <i>Hannemania dunni</i> – North Carolina : Murphy, 1965 L: <i>Hannemania eltoni</i> – Texas : Sambon, 1928, Ewing, 1931, Hyland, 1956, Radford, 1942 L: <i>Hannemania hegneri</i> – Florida : Hyland, 1956; laboratory experiment : Hyland, 1961 L: <i>Hannemania penetrans</i> – North Carolina : Brandt, 1936; Oklahoma : Kuntz, 1941 L: <i>Hannemania</i> sp. (?) – Louisiana : Hubert, 1927
Tarahumara Frog (<i>Lithobates tarahumarae</i>) L: <i>Hannemania anurae</i> – Jalisco, Mexico : Welbourn and Loomis, 1970 L: <i>Hannemania monticola</i> – Sonora, Mexico : Goldberg et al., 2002
Plethodontidae
Green Salamander (<i>Aneides aeneus</i>) L: <i>Hannemania dunni</i> – Georgia : Loomis, 1956
Ouachita Dusky Salamander (<i>Desmognathus brimleyorum</i>) L: <i>Hannemania dunni</i> – Arkansas : Winter et al., 1986; Oklahoma : Anthony et al., 1994 L: <i>Hannemania</i> sp. – Arkansas and Oklahoma : McAllister, Bursey et al., 1995
Dusky Salamander (<i>Desmognathus fuscus</i>) L: <i>Hannemania dunni</i> – eastern United States : Sambon, 1928, Ewing, 1931, Hyland, 1956; Arkansas : Loomis, 1956; North Carolina : Rankin, 1937, Westfall et al., 2008; Oklahoma and Texas : Loomis, 1956; laboratory experiment : Hyland, 1961 L: <i>Hannemania</i> sp. – Tennessee : Regester, 2001
Northern Two-lined Salamander (<i>Eurycea bislineata</i>) L: <i>Hannemania dunni</i> – Alabama : Hribar and Tyler, 1989; North Carolina : Loomis, 1956; West Virginia : Shoemaker and Clark, 1975
Southern Two-lined Salamander (<i>Eurycea cirrigera</i>) L: <i>Hannemania dunni</i> – Florida (?): Hyland, 1961; North Carolina : Rankin, 1937, Westfall et al., 2008 L: <i>Hannemania hegneri</i> – laboratory experiment : Hyland, 1961 L: <i>Hannemania</i> sp. – Tennessee : Regester, 2001
Three-lined Salamander (<i>Eurycea guttolineata</i>) L: <i>Hannemania dunni</i> – North Carolina : Rankin, 1937
Graybelly Salamander (<i>Eurycea multiplicata griseogaster</i>) L: <i>Hannemania</i> sp. – Arkansas : McAllister, Trauth and Bursey, 1995a
Western Slimy Salamander (<i>Plethodon albagula</i>) L: <i>Hannemania dunni</i> – Arkansas and Missouri : Anthony et al., 1994
Ozark Zig-zag Salamander (<i>Plethodon angusticlavius</i>) L: <i>Hannemania dunni</i> – Arkansas : Maksimowich and Mathis, 2000, Maksimowich and Mathis, 2001, McAllister et al., 2013
Caddo Mountain Salamander (<i>Plethodon caddoensis</i>) L: <i>Hannemania dunni</i> – Arkansas : Loomis, 1956, Crossley, 1960, Duncan and Highton, 1979, Winter et al., 1986, Anthony et al., 1994 L: <i>Hannemania</i> sp. – Arkansas : McAllister et al., 2002
White-spotted Slimy Salamander (<i>Plethodon cylindraceus</i>) L: <i>Hannemania dunni</i> – North Carolina : Westfall et al., 2008
Fourche Mountain Salamander (<i>Plethodon fourchensis</i>) L: <i>Hannemania dunni</i> – Arkansas : Duncan and Highton, 1979, Winter et al., 1986, Anthony et al., 1994; Oklahoma : Anthony et al., 1994, Duncan and Highton, 1979
Northern Slimy Salamander (<i>Plethodon glutinosus</i>) L: <i>Hannemania dunni</i> – Arkansas : Duncan and Highton, 1979; North Carolina : Rankin, 1937; Oklahoma : Duncan and Highton, 1979

Table 1 (cont'd).

Kiamichi Slimy Salamander (<i>Plethodon kiamichi</i>) L: <i>Hannemania dunni</i> – Arkansas and Oklahoma , Anthony et al., 1994 L: <i>Hannemania</i> sp. – Arkansas : McAllister et al., 2002
Rich Mountain Salamander (<i>Plethodon ouachitae</i>) L: <i>Hannemania dunni</i> – Arkansas : Loomis, 1956, Duncan and Highton, 1979, Winter et al., 1986; Oklahoma : Anthony et al., 1994, Duncan and Highton, 1979 L: <i>Hannemania</i> sp. – Arkansas : McAllister et al., 2002, (?) Pope and Pope, 1951
Mud Salamander (<i>Pseudotriton montanus</i>) L: <i>Hannemania dunni</i> – North Carolina : Rankin, 1937
Unidentified Lungless Salamander (<i>Plethodon</i> sp.) (?) L: <i>Hannemania eltoni</i> – Georgia : Crossley and Proctor, 1971
Salamandridae
Eastern Newt (<i>Notophthalmus viridescens</i>) L: <i>Hannemania hegneri</i> – laboratory experiment : Hyland, 1961
Ambystomatidae
Spotted Salamander (<i>Ambystoma maculatum</i>) L: <i>Hannemania dunni</i> – North Carolina : Rankin, 1937
Marbled Salamander (<i>Ambystoma opacum</i>) L: <i>Hannemania dunni</i> – North Carolina : Rankin, 1937
Tarahumara Salamander (<i>Ambystoma rosaceum</i>) L: <i>Hannemania monticola</i> – Durango, Mexico : Welbourn and Loomis, 1970
Eastern Tiger Salamander (<i>Ambystoma tigrinum</i>) L: <i>Hannemania eltoni</i> – Kansas : Loomis, 1956 L: <i>Hannemania</i> sp. – New Mexico : Grover et al., 1975

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The Big Windy Pyro Caper

Roger A. Repp

National Optical Astronomy Observatory

repp@noao.edu

Directly from my herp journal, Wednesday, 30 April 2014:

“Tomorrow, I will meet Dave Barker at Phoenix Sky Harbor Airport, and blaze to the Forest Glenn Cabin in Prescott. There we will join Gery Herrmann. Mike Dloogatch, Steve Barten, Ralph Shepstone and John Archer will arrive after us. I will do my best to chronicle what happens after that, which will be difficult. My own mission is to lead my true brothers to Pyros, Rosy Boas and Speckled Rattlesnakes. If we get all three, I will be ecstatic. In any case, the next six days will be the best time that I will have in 2014. To say that I am looking forward to it all would be a vast understatement. Let’s rock!”

Not mentioned in my notes was the fact that on Saturday, 3 May, a couple of local herpetological ringers were going to lead the charge to the Promised Land for us. John Slone and Marty Feldner were going to take us to a series of Arizona Black Rattlesnake (*Crotalus cerberus*) dens on this day. Slone and Marty are both Gung Ho herpetologists, and rattlesnake aficionados to the core. They are extremely adept at finding all manners of herps in the field, and are always an asset to have on any field trip.

Our mission to their field plot was not necessarily about finding *cerberus*, although any species of rattlesnake will always thrill us. Contained among the same boulders that harbor the *cerberus* are also good populations of Pyro Mountain Kingsnakes (*Lampropeltis pyromelana*)—hereafter simply called “pyros.” Ralph, Mike, Dave and I had all checked pyros off our life list some time back. But Steve, Gery and John Archer had yet to see one in the wild. In years past, I had promised pyros to Steve and Gery, but our attempts to find one were a bust. The fact that they returned to Arizona for one more go showed both grit and determination, not to mention a few loose screws in their craniums.

But this time *would* be different. First off, we had our two ringers. Secondly, Prescott was chosen because of its propensity to consistently produce the much-coveted tricolored jewel of Arizona. The word amongst the local herpers here is that if you can’t find a pyro in Prescott, then you couldn’t find your butt if it had a blaring foghorn affixed to it. And not only are they comparatively easy to find here, they are, at least in this author’s opinion, the most beautiful pyros in the great state of Arizona. They have more bands, the red bands are vibrant, and the black banding that can sometimes wash out the top view of a pyro are narrow. In short, more bands, brighter reds, stunning white bands in between, and less black crowding the dorsal view.

As for me, the guy who set this all up, I had been to Prescott a total of three times. With the first visit, I blundered on a pyro on the crawl in a buddy’s backyard. With the second visit, I became hopelessly lost, and focused mainly on surviving that experience. With the third visit, my friend Melissa Amarello, (see the epilogue to this article for more on Melissa), and I found one in the exact spot that another herper told us he had seen one earlier that day. The whereabouts of that location remain unknown to me to this very day. In short, at the time of this trip, I was unfit to guide

anybody to a pyro in Prescott. But there was little sense in informing my Big Windy buddies of that fact. Had they known, they would have dropped me like a soiled glob of toilet paper, and gone elsewhere. Instead, I kept telling them “You can’t go wrong in Prescott” with *far* more assurance than I actually felt.

1 May 2014

After many months of planning, May Day of 2014 finally arrived. Without incident, I met Dave Barker at the Phoenix Sky Harbor airport, and together we left the land of saguaros behind and jetted into the pines. Gery Herrmann had been staying at the Forest Glenn cabin for several days, and was there to greet us when we arrived. Within 15 minutes of our arrival, the remaining four Big Windies showed up, and it was time to inspect our lodgings for the next five nights.

To say that we would be walking in tall cotton for our stay at Forest Glenn would be a vast understatement. The cabin had three levels to it. The ground level was actually a recreation room, resplendent with a pool table, ping pong, foosball, two bedrooms and a bath. The next level was the living room, with a flat screen TV and comfy couches that encircled it. There was also another bathroom, two more bedrooms, and a fully equipped kitchen with all amenities. The top level contained two more bedrooms. The two lower levels had a sliding glass patio door that led to a spacious deck, which traveled the length of the back. A hot tub was buried in a side enclave in the decking between the two levels. The cabin was poised at the top of a hill, and one could sit on that rear deck and see nothing but forest and hillsides for miles. Surrounding the cabin on all sides stood massive Ponderosa Pines. Many bird feeders were scattered at deck level among these pines, and all manner of bird life swooped in to capitalize on the offerings. Heaven on earth comes to mind when describing the Forest Glenn, and a band of seven herp buddies were already loving life to the max. And we were just getting started!

Once the vehicles were unpacked and all rooms stuffed with personal effects, it was time to raid the local supermarket for supplies. A shopping list was painstakingly prepared. Each of us might at any moment be called upon for cooking details, and each of us had our own specialty to contribute to each meal on demand. We scattered about said supermarket in Prescott seeking the choicest of morsels. Meanwhile, we completely hammered the liquor department in the process. (It was a bad day to be the town drunk in Prescott). Soon, our massive Forest Glenn refrigerator was stuffed to maximum capacity, with some residual coolers prepared for the next day. There next followed an exquisite feast, the cleanup, some table tennis and foosball matches, and much herp-talk ensued around the table on the deck until it was time to turn in.

2 May 2014

One of the many glorious benefits of herping at 6500 feet in

elevation is that there is no need to crucify oneself by starting ridiculously early. The pyros that reside in Prescott move deep into boulders for the cold nights, and don't emerge until late in the morning. There was plenty of time for swilling coffee and going out for a big breakfast—which was the plan for this morning. Gery, Dave and I were up earlier than the rest, and scouted the area near the cabin. As we were rolling down the backroads, I was looking for something that had the gestalt of the *cerberus* study plot that we would visit with Marty and Slone the next day. (I had actually been there twice. But both times, I deliberately did not pay attention to the location, lest I become tempted to visit on my own someday --- which would not have been well received). At first, all that was viewed along the roads we traveled were undulating hillsides with zero structure. There was nothing but tall trees, pinecones, and pine needles on steep slopes to behold. And then, a few boulders began to appear on our left. As we continued onward, these boulders started to collect some boulder buddies. In a very short while, we beheld some impressive boulder piles scattered about the landscape. Each of these piles were near-exact replicas of what we would see the next day with our two ringers.

In all, there were about 50 boulder piles scattered about this site. They covered an expanse roughly a half-mile wide, north to south, by over a mile long, east to west. They were not a continuous stretch of boulders, but rather, island-like stacks of habitat, each well-separated from the next by patches of forest and grasslands. They were composed of lichenous exfoliated granite. The largest of these piles might contain boulders the size of a barn. Some of these massive chunks of granite were surrounded by stacks of boulder rubble at their bases. Growing out of the jumbles of rocks were stunted oak trees, and various creeping vines intertwined around and among each of the islands. Many of these boulders had various splits, narrow crevices, or stacks of caprock on top. In short, it looked like a damn good place to start if we were seeking pyros.

Having found a good starting point for the day, we returned to the cabin with glowing reports of what we had found. Following the breakfast festivities, we caravanned in two vehicles to the boulder fields. We arrived at 1055. The air temperature was 23°C (73.4°F), the skies were cloudless, with 16% humidity, and 0–8 mile per hour breezes. In other words, Arizona perfect!

Knowing our propensity for drifting off in various directions without regard for keeping tabs on each other, we agreed to meet back at the vehicles by 2 P.M. If any one of us dropped dead or got lost in the hinterlands that we were scouring, we would not have started searching the area for them until after two o'clock! Such is the wont of independent-minded herpers.

While I occasionally bumped into one of the members of our party, I was mostly working alone. In this area, there are two ways to seek pyros. The first is to hope to find one out on the crawl on open ground. This can happen on occasion, and is *always* a stunning sight when it does. But this approach, which I call "The more luck than brains approach," is far less likely to succeed than employing method number 2. In the vicinity of Prescott, pyros set up shop in rock crevices. Method number 2 involves a patient and downright ponderous approach. One must first advance toward and completely encircle every boulder pile,

taking note of every narrow crevice that appears in each. Under sunny conditions, like today, as one encircles a boulder pile, one breaks out a mirror and carefully reflects sunlight into each crevice or split. This allows one to pick off anything obvious, but does not often lend the deep view that is required in order to see a pyro. Once the pile is thusly encircled, the astute pyro hunter will break out a high powered, narrow beamed flashlight, belly up to boulders and look deep in the choicest of crevices. The perfect pyro crevice is usually less than 20 millimeters tall, and perhaps a meter or so in length. The inner walls of the perfect crevice are smooth. My speculation is that pyros favor south and west-facing crevices, but I always do my best to check them all, regardless of the direction they may face. It does not seem to matter if the crevice is vertical or horizontal in orientation, as long as it goes deep into the harboring boulder. Some of the crevices that I was searching ran very deep—I could see perhaps 3 meters into them by employing my flashlight. Deep-running crevices are yet another thing to look for, as the perfect pyro crevice will allow the snake to get entirely out of sight.

But the truly perfect pyro crevice is the one that has a pyro in it. That didn't happen for any of us this morning.

What *did* happen was that at 1310 hours, I got a glimpse of the rear half of a young male *cerberus* disappearing around the corner of a massive boulder. This snake was on the crawl, and had not yet noticed me. With great excitement, I readied my camera, and slipped around the obstacle to snap some images. As luck would have it, the set up for the images that followed was not the best. I was in direct sunlight, and shooting into shadows. The snake remained unaware of me, as he was in foraging mode. He was crawling slowly away from me, tongue-flicking the mulch of pine needles and oak leaves beneath him, and moving straight toward a cavernous opening. When first viewed, he was half in the sun, and half out. Hence, the first few images of the front half of the snake are too dark, with the rear nearly obliterated by sunlight. He continued crawling toward the mini-cave in front of him, until such time as he was about to slip out of sight. It was then that I employed my walking stick to block his ingress, and whisked him out of the hole. (So much for any in situ shots for the rest of the photo session). The snake reared into a defensive posture, and began rattling profusely. I eased into the shade in front of him, and half-heartedly took some images of him in defensive mode.

His long tail indicated that he was a male. His rattle count was basal plus four segments and a button, indicating him to be a young snake—perhaps three years old at most. He was roughly 60 centimeters (~2 feet) in length. His base coloration was a dull greenish off-white, and his blotches were a dingy brown. While *cerberus* can be among the most beautiful rattlesnakes in the world, this one was dog ugly, and unremarkable in appearance.

Nevertheless, it *was* a rattlesnake, ugly or not. With this in mind, I clambered to the top of the boulder field this snake was occupying, and began bellowing in a foghorn-like fashion for my companions to come see. For fully five minutes, verbal thunder emanated from my gullet. Little birdies fell from the trees, blood oozing out of their ears. As far away as Africa, confused wildebeests plunged into waterholes, where they were immediately devoured by crocodiles. Elephants stampeded in



Figure 1. Gilbert's Skink (*Plestiodon gilberti*). Four of these impressive lizards were observed our first morning out, but nobody was able to get a photo. Hence, we pull in this ringer from Marty Feldner.



Figure 2. Male Arizona Black Rattlesnake (*Crotalus cerberus*) as observed just east of Caprock Den, 3 May 2014. Image by Steve Barten.



Figure 4. "Old Yeller," as found on 3 May, 2014. Image by Steve Barten.



Figure 3. Sub-adult *Crotalus cerberus* coiled near flush with the edge of Caprock Den, 3 May 2014. Image by Steve Barten.



Figure 5. In situ image of the first Pyro Mountain Kingsnake (*Lampropeltis pyromelana*) found by Gery Herrmann on 3 May 2014. “I can go home now!” Image by Steve Barten.



Figure 6. Male *Crotalus cerberus*, “Ron,” in situ. Note the calm resting posture of this snake. The pupil of the left eye is rolled downward. There is a strong possibility that Ron was sleeping at the time of the photograph. Image by Steve Barten.



Figure 7. Adult female *Crotalus cerberus* found on the crawl away from the dens. Her distal plumpness indicates pregnancy. Compare this female to the males in Figures 2, 4 and 6, and note the absence of yellow highlighting her dorsal blotches. Like many species of birds, the male *C. cerberus* is often more colorful than the female. Image by Steve Barten.



Figure 8. Shelter that was being used by pyro found by Ralph Shepstone, 5 May 2014. Image by Steve Barten.



Figure 9. In situ photo of pyro in crevice shown in Figure 8. “The perfect pyro crevice will *always* have a pyro in it.” Image by Steve Barten.



Figure 10. Two *very* happy herpers, Ralph Shepstone (L) and Steve Barten (R) displaying the pyro that they just removed from the crevice in Figures 8 and 9. Image by the author.



Figure 11. Ralph’s female pyro in the hands of Dave Barker, shown for both the beauty and the size of the snake. Image by the author.



Figure 12. Posed shot of the pyro under discussion in text and Figures 8–11. Image by Steve Barten.



Figure 13. The author foolishly did not photograph what he saw on 5 May with his deep look at the inner workings of Caprock Den. This image, provided by Marty Feldner, gives an indication of what was viewed here.



Figure 14. Woohoo! Are these guys having fun or what? Gery Herrmann whoops it up, Steve Barten grins out of rapture, and Dave Barker attempts to ascertain the gender of one of the pyros that he helped to catch. The snakes were soon returned to their crevice. Only the beer bottle came back with us. Image by Mike Dloogatch.



Figure 15 (see also cover photo). The capper of our adventure! The two pyros that Gery found on our last day of seeking them. Image by Steve Barten.



Figure 16. The post-photo-session return of the two pyros to their crevice. Can we go home now? You bet! Image by Steve Barten.

terror, mowing down villages of pygmies in the process. But did my buddies hear me? Nope! When no responses were heard, it was decided that my companions were just plain out of luck with this snake. Hopefully, it would not be the only *cerberus* seen on this trip.

By the time I got back to the snake, he was still rattling, but was easing out of his defensive posture. He continued to glower at me, rattle blazing, as he slowly and uneasily slipped into the safety of the hole he had tried entering earlier. I continued to hear his rattle blazing long after he was out of sight.

I arrived at the vehicles at precisely 2 P.M. as did everybody else. As it turned out, the *cerberus* just described was the only snake found that morning. Normally, that would make me the hero, but the fact that I did not bag it and lay it at their feet caused some muttering. Stink-eyed expressions were cast upon my person. It was then suggested by the person who found the snake that he had bellowed the names of a bunch of people whose ears must be full of pus. How the hell could they *not* hear me? He went on to say that it is bad form to go about breaking the serene silence of a forest by calling out the names of a bunch of idiots. What was I supposed to do, bag the snake, walk a mile with it, wait an hour for them to photograph it, hoof another mile back to release it, and then yet another mile back to the vehicles? Every ounce of daylight would be burned by the process! All for a rattlesnake had fallen out of the ugly tree and hit every branch on the way down. The defensive tirade, coupled with lame promises that many more would be found soon, lightened things up.

While the rest of the group did not find any snakes, they did report seeing four Gilbert Skinks (*Plestiodon gilberti*). Bulky in the fuselage section of their bodies, with massive brown-to-orange heads and green to olive drab base coloration, they are always an impressive sight. I would have gladly traded my rattlesnake sighting for one of these (see Figure 1).

Following lunch, we began seeking high places that overlooked the valley that was directly behind our cabin. From other angles, we had noted that at a distance of a mile or so from our residence a massive boulder structure rose above treetop level. There were no other structures to speak of in the vicinity, and there were no roads leading to it. In other words, we had a lone island of habitat that was not going to be ruined by civilization. If we could just get to it, we might very well have a herp Mecca in our backyard. While we were able to get some good looks at our potential new Shangri La from the different aspects the road offered, we could not ascertain which direction the cabin may be in relation to it. There was only one option remaining, and that was to get back to the cabin and try to hike it out.

Upon our arrival back to the Forest Glenn, we began scouring the many topo maps that we had in our possession. We could plainly see the contours of the structure that we were trying to find, but we could not quite figure out exactly where the cabin was in relation to it. Everything that I was seeing led me to believe that if we just plunged down to the drainage behind the cabin, said drainage would take us directly to the place. Others didn't see it that way, and in the end, we all slipped our way down the menacingly steep hill behind the cabin, and headed whatever direction we thought best. As I was alone in my

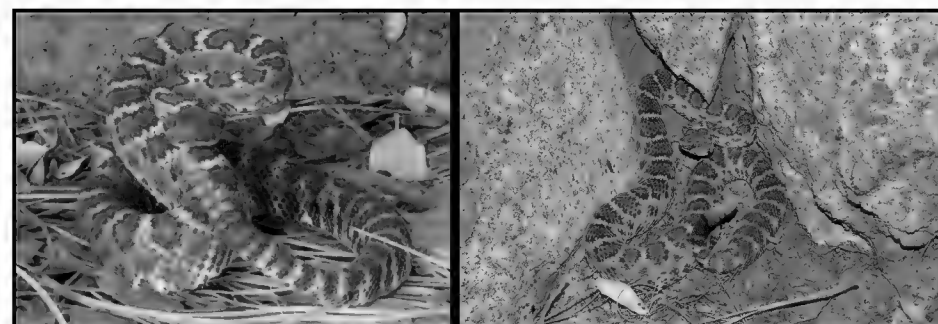
thoughts about where the structure was in relation to the cabin, I was alone with my approach.

If there is any truth to the old adage "what goes up must come down," we were all about to learn the opposite is also true. Having spent decades hiking the hillsides has taught me to *never* start a hike going downhill. It is *always* best to start at the bottom and work one's way up. But in this case, we had no choice. From our back porch, *everything* worth seeing was downhill!

And so, I hiked until I reached the edge of the world, finding absolutely nothing in the process. Then, what went down, had to come back up. During the uphill climb that followed, it was learned that the extra 40 pounds of girth around my burgeoning midsection did not exactly make the ascent any less arduous. But I was able to lose some small globules of mass by hawking up some pieces of useless black lung tissue. I'll never forget the view of cabin as I made the final assault. By this time, it was twilight, and the remaining 100 meters was so steep that if one stood up straight, the ground was inches in front of one's nose. On knees that creaked, and hips that were scraping raw sockets, inch-by-inch, I slowly ground and groped my way upward. Every time I looked up at the cabin, it seemed to move farther away. Finally, in far more time than it takes to tell the story, I was on the deck, swilling beer with four buddies. The reason there were only four buddies, instead of six, was because two more said buddies, namely Steve and Gery, were still in the bush.

Of the group that was there, only President Archer had scored. He found a *cerberus* roughly equal in size to the one that I had found earlier that day, only his was a female, with a rattle that was basal plus five segments, the sixth being broken. The string of rattles had only a slight taper to it, indicating that his find was an older snake, perhaps approaching eight years of age (or older). As in many species of rattlesnakes, there is sexual size dimorphism in *Crotalus cerberus*. Adult males grow roughly 20% longer and heavier than the adult females. And while the male I found didn't necessarily show it, like male birds as opposed to females, male *cerberus* are noticeably the more beautiful. Archer's *cerberus* had a base coloration of light gray, with darker gray blotches, at least at the time he found it. A little known fact about *cerberus* is their ability to change color. An individual can morph from being nearly jet black to a dull gray or brown in less than five minutes! While waiting for our missing buddies to return, we compared the snakes on our camera screens, noting the different lengths of the tails. Rattlesnakes are among the easiest snakes in the world to determine gender at a glance, as the male's tail is longer than the female's (see figure below).

Steve and Gery finally made it back to the cabin, looking not



With many species of *Crotalus*, the true rattlesnake aficionado can ascertain the gender at a glance. Male *Crotalus cerberus* on left, female to right. The male's tail is obviously much longer than that of the female. Images by author and David G. Barker.

unlike something a cat might drag in. They had worked their way up the wrong drainage, and actually continued uphill for a mile past the cabin. They realized their error when they reached the main road, which they utilized as their return route. They had found nothing for all their effort. There was going to be a rampant epidemic of painful joints the following day.

3 May 2014

Upon awakening, it was noticed that *everything* hurt. This author feels that he can safely say that he wasn't alone in the pain department. Six out of seven of us were either pushing 60 years of age, or edging all too quickly past it. We're all far too long in the tooth to go around herping all day without the severe ramifications of such activity taking their toll. Our morning breakfast included generous doses of various anti-inflammatory drugs, in the hopes that better living might be achieved through chemical inducement. Were it merely any other day, I might have been inclined to just hang out at the cabin, and nurse my decrepit body.

But nope, there was to be no wussing on this day, for Mr. Slone and Mr. Feldner were going to give us the golden key to a herpetological Mecca. We were going to step into an area that was so infested with *cerberus* that it wasn't a matter of *if* we would see some, but rather, it was matter of *how many* we would see. As much as I wanted us to find a pyro, my day was going to be made by tripping over rattlesnakes.

We left ridiculously early, in hopes of getting a little herping in at the place we were to rendezvous. But unbeknownst to us, the town of Prescott had other plans for us. The civic leaders of Prescott were throwing a centennial bash, celebrating the 100th birthday of their incorporation as a town. They kicked the festivities off with a fun run. In all, at least a dozen people showed up for said fun run, which was enough for the local cops to shut down all the main routes through town. When it comes to control and containment, the Prescott Police Department were bastions of efficacy. After waiting over 20 minutes at one crossroad, Gery sagely flipped a U-turn, which was instantly imitated by the rear vehicle in our caravan. We somehow got through it all. We also learned that when confronted by determined, pissed-off herpers, fun runners are quick to yield the right of way.

We still managed to arrive at our meeting spot early, but found Mr. Slone and Marty already there and waiting for us. There were quick introductions, and no further messing around. Mr. Slone put our drivers to the test, as he is always in a hurry. Slone's driving techniques on rutted back roads are such that all we saw of him was a blazing dust storm, which we pursued at breakneck speed. Five minutes later—for three of which our vehicles were airborne, Slone pulled over. Our vehicles slipped in beside him, and nine herpers began fumbling for equipment. Backpacks, mirrors, flashlights, cameras were gathered to the staccato tempo of doors opening and thumping shut at least fifty times too many. There next was the necessary ground watering ceremony. Once nine bladders were gladder, it became time to assemble.

My only introductory remarks centered on how easy it was to get lost here, that all should take great pains to know at all times

where they were in relationship to the vehicles. This brief oratory was met with some snickers and haughtiness on the part of the Windy Fellowship. Fine! As we were to learn later, he who laughs last laughs best. It was time for Marty and Slone to take over.

There were few words spoken by our leaders. Most of these words dwelled on the fact that we were entering a formal rattlesnake study on social behavior. Hence, any and all rattlesnakes observed were to be left on the ground, or in their crevice dens unmolested. Pyros were quite the different matter. If we found any of those, we could have our way with them. They told us this would be a short trip, and that we should all stay in voice contact. With that, they crossed the grassy meadow toward a forest, and we fell in behind them. It was exactly 1000 hours when we did.

The route our two leaders took us became a detour of sorts, as Slone knew of a small boulder pile adjacent to the dens that sometimes contained a *cerberus* or two. I decided to go for the throat. I hooked left at a small trail that would lead directly to the dens. But when I got the point of the final assault, I waited for the rest of the group to catch up. While waiting, I had plenty of time to behold the herpetological turkey shoot that we were about to enter.

If one were to take the boundaries of a football field, divide it into three equal sections, discard two of those sections, and inscribe an arc tangent to the edges of the third section, that would be the extent of the area we were about to explore. It was roughly 30 meters wide in a north-south fashion, by 50 meters long east to west. The area is a natural amphitheater. When standing in the center of the amphitheater and looking upward, exfoliated granite boulders of all shapes and sizes emerge from the leaf-littered ground. A drainage flows through the center, and boulder stacks, some of them massive in size, line either side of said drainage. The area bears witness to a recent fire, as many of the tree trunks are blackened, and scorched limbs and stumps litter the forest floor. Younger ponderosa pines and scrub oak are peppered about, and cast intermittent shade about the boulders and sloping terrain. While it all looks good, there is really nothing that might indicate the magnitude of what is contained within. There are likely hundreds of places like this one scattered around Prescott National Forest. But while several different dedicated, driven and competent individuals like Slone and Marty are chronically seeking new places nearby, they always return to this place. For whatever reason, the place consistently produces a hefty biomass of *cerberus*.

Presently, the heads of my eight companions bobbed into view. They were a contour or two above me, to my right, and on a trajectory that would take them right into the heart of the action. As this was the John Slone and Marty Feldner show, I remained put to see how they would handle what came next. While their next move surprised me, their intent was instantly understood. They both hung back, and let their six guests plunge into the thick of it all. The eyes of the Arizona herpers locked, I gave a subtle thumbs-up from the waist, and they both nodded and grinned back at me.

The Big Windy contingent was being closely watched by the

local boys. We were prepared to laugh at them if they proved inept, but also, ready to approve their methods—if they met our standards. And in a very short time, the latter situation became apparent. This was not their first rodeo. I must confess that I felt a certain degree of pride in my Chicago brethren as they systematically wove a herpetological tapestry among, around, and over top of the boulders. There was no chance of concealment for any *cerberus* that was even remotely visible. As they proceeded into the maze, the Arizona contingent slipped in behind them, checking for anything that they may have missed.

Mike was first to score, coming upon what is the best aggregate den in the area. We call it “Caprock Den.” As the name implies, the *cerberus* occupy a deep running crevice sandwiched between two boulders. The bottom boulder is smooth, almost polished granite, and projects upward out of the soil like an inverted bowl. The bottom contour of the top boulder nearly matches that of the bottom, but is draped over the top in such a way that a south-facing, gash-like crevice exists between the two. On this day, there were two *cerberus* viewed here. The first was a boldly patterned adult male, who was out loosely coiled on pine needles just east of the crevice. The second was coiled nearly flush with the crevice edge, looking out at us (Figures 2 and 3). One by one we drifted over to admire and/or photograph Mike’s find. The approach by all was so careful that neither snake spooked or rattled, in fact, none of the rest found rattled either. This is possibly a relic of being closely observed for several years, but also, credit should be given to the pains taken by the group to respect the study animals.

The next 20 minutes involved all of us working our way around and through the amphitheater of boulders, sweeping the arc from east to west. Three more *cerberus* were encountered during this time period. The third to be found was on the east side of the largest boulder in the vicinity, near the top of the western edge of our honey hole. The boulder is similar in shape and size to an 18 wheel semi truck. This particular *cerberus* is the most magnificent of the lot to be found here. He is roughly a meter long SVL, with a mass of just under a kilogram. His size alone makes him impressive, but it is the screaming yellow encapsulation of the chocolate brown blotches on his back that makes him so distinctive. I had seen him on both of my previous visits, and had subsequently named him “Old Yeller” (Figure 4).

While admiring Old Yeller, I became aware of a commotion uphill from me, just on the other side of the big boulder. Gery stepped into my view, a look of sweet rapture on his visage.

“I can go home now!” He exclaimed.

Could it be? Naw—no way! But could it be? **Yes!** Drop your linen and start to grinnin’! Raise your rent, cash in your chips, count your piles of money, and let the parade commence—for Gery had just found a pyro! Yahoo! In an instant, everybody gathered. The air rippled with electric enthusiasm. There were hugs, macho backslaps, and handshakes all around. While it was Gery who was the hero, a tremendous team effort had transpired to make this happen. This culmination of a dream was not just Gery’s to rejoice about, but a definite one for all and all for one climactic moment. Yeah ***baby!***

After the revelry had gone on for long enough, my lone voice

of confused consternation entered the fray. “Uh—where is it?” Gery pointed it out. We next refer to my field notes, taken moments after my first look, along with a great Steve Barten image of the event (Figure 5).

“Pyro! 1035. GPS = (Wouldn’t *you* like to know?), 25°C (77°F), 0% clouds, 11% humidity, 0–3 mph breeze. Pyro is about 2.2 meters up in ~3 m tall × 5 m long × 3 m wide boulder. ~20 cm deep in southwest facing horizontal crevice, ~70 cm long snake.”

We now leave the snake firmly entrenched in the crevice for a moment, and backtrack to my discussion with Marty and Slone about what might take place should an event like this happen. Said discussion transpired at least a month before this day. My concern was for my out-of-state friends. I knew that they were conscientious lot, and would consider our wish to be their command. Had this been just Marty, Slone, and me, we would have photographed that pyro in its moorings, and called it good. But we live here. We can do this any time! Our six companions had invested a lot to be here, and while the simple act of finding a pyro would have floated their boats nicely, they would of course enjoy the moment all the more if they had the pyro in hand. When this was first brought up, I fully expected Slone or Marty to say “No way! Anything we find stays right where it’s at.” To my surprise, they both shrugged and said “We don’t care! If they want to try to catch one, let ‘em!”

The notion of fishing any snake out of a crevice is foreign to me. Truth be told, I wasn’t even sure how to do it. When I brought this up, Marty simply said “I use the chopstick method.” This was the extent of our how-to-catch-a-pyro-in-a-crevice discussion. I took Marty’s statement at face value. When I relayed this information to the other Windies via email, I told them to bring chopsticks with them, and followed my own advice to the letter. Hence, we all visited our favorite Asian dining places and pilfered their chopsticks. We were all carrying our stolen contraband with us, ready to dig pyros out of a crevice the way we might fish noodles out of our shark fin soup.

Thus it came to pass that two stouter members of our party each grabbed a handful of Gery’s butt cheeks, and thrust him up the face of the boulder. Steve scrambled to the top, sprawled out on his belly, and prepared to work the crevice from above. While chopsticks might work well on egg foo yung, they proved inadequate for a tight-bodied and muscular colubrid dug in deeper than a Texas tick, clinging like a terrified hemorrhoid to its crevice home. Both herpers gave it a heroic effort by stabbing, jabbing and fumbling with their blunt and totally useless instruments. In short order, the pyro seized the first escape opportunity, and jetted out of sight, giving pause to evert its cloaca in our general direction before doing so. In the end, the score was Pyro:1, Herpers: 0.

There was little left to do but proceed to try to find another one. But we were rapidly running out of habitat and time. We had agreed on a quitting time of 1130 hours. Nevertheless, with such a limited time frame, we were able to find three more *cerberus*. It was my pleasure to be herping side-by-side with my high school chum Dave Barker, and witness him finding the last *cerberus* of the morning. The one he found is one that was

named after my little brother Ron a few years back. Ron was coiled in a shady escarpment of a boulder pocket, his stunning black and gold coloration greatly dwarfing his namesake in beauty and grace (Figures 6 and 7).

We also found three young Greater Short-horned Lizards (*Phrynosoma hernandesi*). These were all of the same size class, roughly 60 mm in length. These cute little goggers were welcome additions to our adventure.

As per plan, we all met at the vehicles at the proper time. Mr. Slone once again led us on a harrowing, high speed, white knuckle four-wheel-drive experience to the place where round two of our day would commence. Upon parking, there was no need for our guides to point out the place we were heading. Just to the left of where we parked was a long and continuous ridge. The ridgeline thrust upward from the forested ground an average of 20 meters tall, was about 100 meters wide, and seemed to extend forever. Whereas the previous places we had visited were composed of boulder piles separated by undulating patches of forest, this area was a long stretch of boulder jumbles—some of which were massive. Contained within the framework of many of these boulders were more cracks than a proctologist sees in a lifetime.

We wasted no time immersing ourselves into this fabulous terrain. But our guns fell silent for a very long stretch of time. After about an hour of painfully hobbling up and down ridges, this author had had enough. His funometer was pegged! He was well over a half hour late for an appointment with the bottled version of the world's most interesting man, and they were beginning to lay off workers at the brewery that produced his favorite nectar.

Of course, it would only make sense that the next pyro was found at the exact point where I had pulled an ice cold one from the cooler. At about 300 meters distant, at the highest point on the ridge, the form of Dave Barker appeared. "Hey Raj!" He shouted. (He spells my abbreviated name as "Raj." Hence, when he hollered my name out, the obvious verbal typo must have been apparent as well). "We got a pyro!" Seeing Dave way the hell up that ridge was reminiscent of my view of our cabin the night before. The only difference was that then I *had* to make the climb to the cabin. This was not the case today.

"I ain't moving!" thundered my response, "stop bothering me, would you? Can't you see that I'm trying to herp our parking spot?" And I waved him off. But true to my word, as soon as my hefty backside settled on top of a comfortable stump, my eyes were on the ground in front of me. Had a pyro come crawling by within a meter of me, I would have nailed it! (As long as I didn't have to get up to do it). Approximately one six pack later, the group came shuffling back. They had found two pyros, and thanks to some proper instruction from our ringers, they were able to get one out of the crevice for some photos. The pyro was released back into the crevice from whence it came when they were through.

We all spread out and lounged about for a while, and then jetted off for our third and final destination. This time, I gave it my all, although the time would have been better spent taking a nap. It was the same for all the rest of the Big Windies, as well as

Slone. Marty was the last to arrive, with a report of finding two more pyros. His offer to take us to them was unanimously declined. Marty did not seem overly disappointed by our lack of enthusiasm, as even he was nearing exhaustion. All pyro-seeking funometers were now officially pegged. It was time for a different form of fun.

We invited Mr. Slone and Mr. Feldner to our cabin for the night. A hearty steak dinner was prepared, and it is here that the total harmony and efficacy that transpired with each cooking effort at our cabin should be described. First off, never once was it merely a meal. It was always a banquet, fit for kings. Each of us participated by contributing a personal culinary specialty item of ours. Many hands made light work of each meal. Those not involved with cooking were setting the table, or cleaning up afterward. It was rare that anybody was asked to do something, as each knew instinctively what had to be done. We didn't look upon our chores as work, but rather, fun. It was almost like we were in a friendly competition to make everything we did enjoyable to the max. But of course, the best part of any meal was the actual consumption. On this evening, Dave made us some jalapeño poppers as appetizers. They were masterfully stuffed with cream cheese, and topped with seasoned salmon chunks. While these were greedily consumed with gusto, Gery expertly grilled up his eggplant, pepper and onion dish, all elegantly basted in a melt-in-your-mouth sauce. The steaks were hand-picked by the master of hand picking raw cuts of meat. A steak is only as good as what you start with, and we are talking about the choicest filet mignon, well seasoned with various herbs and butter. And at the end of it all, chairs were pushed back, rivers of beer and various highballs were swilled, and boisterous conversations resplendent with gales of laughter lasted well into the night. In short, what a great bunch of guys to hang out with! Take me back—I want to do this again!

4 May 2014

This was a day that was reserved for something other than scouring boulder fields in pine forests. This author has been blessed in many ways by being able to correspond with many of the herpetological great ones in our field. One of the greatest is a true whale amongst minnows in our field. We speak of Dr. Bayard Brattstrom. Bayard moved off the grid about a decade or so back, settling in a remote area near the town of Wickieup, Arizona. He has established his own personal museum there, which he has named "The Horned Lizard Ranch." Today was the day we were invited to his ranch, and treated to a tour. There is no way to describe what we saw and learned from this high-energy sparkplug dynamo of a man in anything less than three thousand words. For this reason, we will dedicate the description of the events of this day in a future issue of the *Bulletin*.

Sadly, Mr. Slone and Mr. Feldner would not be able to join us on this adventure, as Slone had to return to work the following day. We all owe them the deepest measure of gratitude for their willingness to guide us to the holy ground. As they are among my very few friends in Arizona, I am proud of them and the way they so easily fell in with my only other circle of friends.

A humorous anecdote is in order before we bid the two



The fine nine on the deck of the Forest Glenn Cabin, 4 May. Counting heads, left to right, Dave Barker, Marty Feldner, Roger Repp, John Slone, Steve Barten, John Archer, Mike Dloogatch, Gery Herrmann and Ralph Shepstone. Image by David G. Barker.

Arizona herpers farewell in this article. Apparently, long after the rest of us went to bed the previous evening, Dave had joined Slone and Marty in the hot tub. A bottle of Jameson whiskey was produced, and that, as well as various other libations, were consumed. When I entered our living room the following morning, Marty and Slone were still sawing logs on the spacious couches there. Dave was pouring himself a cup of coffee. Dave put his arm around my shoulder, and looked me in the eye. His eyes looked not unlike two pinkie mice. He gave a low chuckle, and nodded toward the two herpers still passed out on the couches. In a rasping voice, he shook his head from side to side, and his lips went up the side of his white-whiskered visage as he whispered “I want you to know that these two are *very* bad men.”

While thanks ain’t enough—thank you Mr. Slone, and thank you Mr. Feldner. Your willingness to share the best that Arizona has to offer with us goes beyond whatever words we can express. It goes without saying that it was both of you who made this one of the best herp trips that any of us have ever embarked upon. You done splendid! (see group photo above).

5 May 2014

This was to be the last day of our trip. What to do, what to do? This was discussed at great lengths around the table at breakfast. Finally, in the end, the entire party deferred to me. Why me? But it was clear that this is what they wanted, and for me, the decision was a no brainer.

“Let’s go back to the *cerberus* dens.” Everybody nodded, and the fate of our last day of herping together was decided.

We had but minimal trouble finding the place again, and arrived at 1025 hours. The ambient temperature was 24°C (75°F), a 25% thin cloud cover, 17% humidity, with a light breeze of 0 to 8 mph. Once again, I took the time to admonish my fellow Windies to be careful not to get lost, which was received with same snickers as two days previous. What I didn’t do before we all scattered was set a quitting time. This boneheaded blunder was to set up some interesting consequences later.

We rounded up the usual suspects as we drifted through the now familiar territory. The last person I bumped into before everybody disappeared was Steve. He was busily photographing Old Yeller, who had chosen to curl up beneath a downed and charred piece of tree trunk. The first pyro we had seen two days earlier was not visible today.

While hanging out with Steve, we heard a faint voice yelling something at a great distance upslope from us. We hollered back, and assuming that somebody had found something important, we headed in the direction that the voice seemed to be coming from. Other voices that we couldn’t see were also responding to the first faint cries, which we determined were coming from Ralph. But we must have made a wrong turn somewhere, because even though we continued hollering and heading uphill, no responses were heard. Steve and I then drifted apart, as is our wont, and I decided it was time to freelance a bit.

Back in 2012, I had been led to a *cerberus* den that was on the opposite side of the road from this place. My guide called the place “ATR Den,” which was short for “Across The Road.” While I was highly uncertain that I would be able to find it, I decided to give it a try. Our group would soon exhaust this area anyhow, (or so I thought), and we might need another place to visit later. It is no short walk to get to ATR, but I was greatly pleased with myself when I recognized some of the landmarks that led to it. I eventually saw ATR off in the distance. It is a lone boulder pile, roughly 15 meters tall by 30 meters in diameter. I first saw it from a distance of about 200 meters away. The sun was shining directly on ATR, it was literally glowing, and looked quite inviting. I selflessly decided not to go there, but save it for the group to enjoy together later. This proved to be a mistake, as some very fortuitous circumstances dictated that we never made it there. I instead double-timed my way back, arriving at the vehicles at around noon.

Mike was waiting for me when I arrived. There was nobody else in sight. It was then that we both realized that we had foolishly not set up a quitting time. Knowing these guys like we do, they might *never* come back! About a half hour later, John Archer came back to join us. He had recently seen all members of our party except Ralph. Mr. Archer mentioned that one member of our party admitted to being hopelessly lost, and he had suggested to him that he move downslope from his position, find a road, and wait for us to come with a vehicle to pick him up there. This might have been a good plan, but my own experience at being lost here had taught me that there were literally dozens of back roads and quad trails in the vicinity. We could easily drive endlessly about, and get lost ourselves in the process.

But President Archer insisted that I needed to take my truck and try to rescue him. Both Mike and I thought this was a ridiculous idea, and said so. At this, Archer grew downright adamant, and insisted that we needed to take my truck to perform a rescue mission. We reached a compromise. At my insistence, Archer took some GPS coordinates of our location, and I gave him the keys to my truck. The GPS coordinates assured that our president would not get lost while trying to rescue the errant one. Mike and I would be around to hold the fort down, and

gather any members of our flock who might show up. Meanwhile, there was one hell of an “I told you so—twice!” building up inside me.

As it turned out, President Archer was right—deadly right—and saved the day in the process. Five minutes after leaving, he was back, with one sheepish-looking member of our party riding shotgun. I took one look at the fear still in the eyes of our lost lamb, and dropped all notions of giving him a hard time. He truly had no idea where he was, had lost all sense of direction, everything looked the same, and in general everything he said captured the same feelings of hopelessness that I had felt three years earlier.

Eventually, all members of our party except Ralph drifted back to us, and each said the same thing as they arrived. “We forgot to say what time we were quitting.” Just as few of us were about to start a search party to seek the wayward Ralph, he drifted into camp. Upon noting that we were all there waiting for him, he said “We forgot to say what time we were quitting.” Ralph had found a pyro lodged in a crevice. At first, he tried yelling for us. It was indeed Ralph who had been calling to us when I had been with Steve. He went on to explain that he then waited a long time, and decided to return. He left had the pyro unmolested. Did we want to go see it?

Six voices immediately inquired, “How far is it?” “About a 15-minute walk,” came Ralph’s response. We were up for it—up being the key word. We fell in behind Ralph, and began the longest 15-minute uphill death march that this author has ever endured. But it was worth every agonizing inch.

Like the skilled boy scout leader that he is, Ralph led us right to the place. It was a lone boulder, roughly 2 meters tall $\times$ 2 m wide $\times$ 3 m long east to west. (Figure 8). A narrow crevice actually split this boulder into two parts, from near the top to the bottom, and was located on the southeast corner. This second boulder formed by the split was more like a vertical slab of caprock than a separate boulder, being perhaps 30 cm thick, and leaning a distance of approximately one meter along the southern flank of the mother boulder. The aspect of the vertical crevice was nearly due east, but the comparatively thin slab of caprock cover had a due south exposure. It was the epitome of the perfect thermoregulatory structure for a narrow-bodied ectothermic snake. The temperature gradient that can exist in crevice like this can be highly variable, and all the snake had to do was move up, down, in or out to seek its optimum body temperature.

As we all took turns gazing into the crevice, we all saw a shining example of what a perfect pyro crevice is all about. As stated earlier, “the truly perfect pyro crevice is the one that has a pyro in it.” And this one indeed had a pyro in it! Not only was there a pyro in it, there was a *stunning* pyro in it. Our first view of *the* most sought-after colubrid in Arizona revealed nearly 30 cm of tightly coiled, vibrant flank, roughly 50 cm deep from the top edge of the crevice. An in situ image of this was an absolute requirement, and we all yielded that duty to the omnipotent camera skills of Steve Barten (Figure 9).

Once it was photographed to Steve’s satisfaction, it was time to attempt to get it in hand. Since Ralph was the one who found it, the honor belonged to him. Before he made the attempt, he

showed me the “chopsticks” that John Slone had given to him. They were in reality two thick, plastic lined wire coat hangers, each bent into a shape that resembled a dentist pick. As Ralph is a dentist, who would be better suited for the task? And the same hands that handle a no shake camera, the hands that perform deft surgeries in a veterinary capacity were to help him. It was the Ralph and Steve show! But pulling a wiry and muscular snake like this from the inner moorings of a tight crevice was going to be a daunting task.

As they positioned themselves to either side of the crevice, the remaining five members of our party, who were doing absolutely nothing to assist, suddenly became experts on how to pull this off. We alternated between offering conflicting advice and cheerleading. Meanwhile, I set myself up broadside to the action with my camera, with the notion that win or lose, this attempt would be photo-documented properly. Their first two attempts to snag the snake ended with failure, to a chorus of groans and jeers from the onlookers. But the third time was the charm! (Figure 10).

As thorough and rife as the English language is with all the adjectives that express the pure ecstasy that was felt by all as we passed our prize from hand to hand, they are still inadequate. Better than the best sex I ever had comes to mind, which is the highest form of adulation this crude machine shop foreman can offer. Others writers with bulging foreheads and superfluous vocabularies might string a run on sentence together, packed with commas and semicolons, using such words as rapture, joy, delight, over the top, climatic, fabulous, fantastic, exuberant, magnificent, and maybe even really great. We can all be grateful that they aren’t the ones writing this narrative.

We determined our prize to be a female. With that many experienced eyes examining her nether region, the odds of all of us being wrong are astronomically slight. She had also recently engulfed a recent prey item, most likely a lizard. She was extremely fit, and as beautiful as they come. Of course, many photos from many photographers from many angles followed (Figures 11 and 12).

She would have commanded center stage in any household where she was displayed. I’m sure we all thought about it—at least I did. But without a token of regret, she was released back into the crevice from whence she came. Perhaps we will visit her again someday.

As good as this experience was, things were about to get better. We all scattered with our descent, in more or less a bull rush to get back to the beer, er uh, vehicles. My trajectory was purposeful. With any luck at all, my route would take me directly to Caprock Den. My luck was good. As I approached it from above, weasely eyes shifted both left and right. Nobody was around. Hence, there would be no witnesses for what might happen next. As I slipped around to the crevice side, it was noted that nothing was out on the apron in front of the den. Perfect!

I had been to Caprock Den three times now, and always felt compelled to admire it from a distance. I didn’t want to upset the people doing the study, or their subjects, by doing something stupid. Up to this point, I had never seen the inner chamber of the crevice. But today was going to be different, as there was

nobody to stop me. In as cautious a manner as possible, I slowly slipped onto my stomach—nearly high-centering myself in the process. I belly-wallowed and clawed my way up to the crevice entrance with my flashlight in hand. Once it was at eye level, the flashlight was switched on for several seconds. I swept the crevice from side to side, and shone as deep as I possibly could. What I saw, from side to side, from shallow to *way* deep, (China comes to mind), was coil after coil after coil—as far as the eye could see. The crevice was absolutely stuffed with *cerberus* (Figure 13). I don't really know how many there were, but I quickly counted seven heads. As hard as this herper has tried to find a similar *cerberus* den over the past two decades, he has never even come close. My hat goes off to the people who found this place, and I have nothing but the utmost respect and admiration for their stoic willingness to keep it pristine. Had the wrong people found it, it would have been decimated many years ago. The place ought to be a national shrine!

Upon regrouping at the vehicles, there were still several hours of daylight left for us to enjoy. Various options were discussed, but in the end a stroll across the road to the ATR Den won out. As the leader of the charge, knowing that the hike to ATR Den was not trivial, I put the blinders on and headed straight for it. But there are many distractions along the way, the main one being a deep ravine that is packed with boulders along and above a west-facing embankment. The enticement proved too much for my companions, and a mass mutiny ensued as they headed across a grassy meadow for the place. But with them or without them, I was going to keep my eyes on the prize, and kept heading straight for ATR. This became difficult when “bang-bang-bang” the mutinous herpers found three different *cerberus* out on the crawl in the meadow, but I kept moving. Even President Archer blundering upon an adult Madrean Alligator Lizard (*Elgaria kingii*) did nothing to thwart my purpose.

Just as my foot touched the northern edge of ATR, a cacophony of yelling, shouting, and thunderous “woo-hoos” reverberated through the valley. Gery had scored again! It was ascertained that whatever it was, it was going to be something that I didn't want to miss. With a heavy sigh, I turned from ATR, and started heading the direction of all the commotion. While I couldn't hear everything that was being shouted, the words “pyro” and “double” reached my ears. Pyro? Double? Maybe two of them? Many pounds of lead were suddenly jettisoned from my backside, and a fat old man began his sprint. It wasn't exactly a sprint in the fashion that a sprint used to be for this author. The beer in my hand, and the two in my pockets, coupled by the flapping of various flabby body parts might not conjure the word “sprint” to the casual observer. The aching knees and hips did nothing to contribute to any notion of gazelle-like grace that the word “sprint” might conjure up to the discerning reader. In all fairness, the words “obese toy soldier trot” probably best describe the process. But the 300 meters of distance between us was soon behind me.

My fellow Windies did not let any grass grow under their feet while waiting for Roger's fast waddle to conclude. They were busily spearing into the crevices of all sides of a large chunk of caprock with their chopsticks. Thus far, they had not succeeded in getting the pyros—there were indeed two of them—out. One

genius, who shall go unnamed, suggested that the pickings might be easier if we simply lifted the caprock, and barehanded the snakes. More simply put: “You lift, we grab.” The two who were supposed to lift did so efficiently, and the two who were supposed to grab were equally efficacious. This triumphant moment proved that we were at least 5% smarter than the situation that we were presented with.

And then the crowd went wild! Oh, what a feeling! There were multiple high fives all around, macho back slaps, and the air was full of thunderous “Woohoos” and “Yahoos” (Figure 14). It is unclear if the snakes were enjoying the moment as much as we were, but as they were passed from hand to hand, they didn't voice any complaints. Sucking a bowling ball through a drinking straw might be an easier process than the photography that followed. Pyros are notoriously uncooperative photographic subjects. But thanks to the expert wrangling of Dave and Gery, the squirrely pyros finally calmed down enough for Steve to accomplish the deed (cover photo and Figure 15).

While the breeding habits of pyros are not clearly understood, evidence is mounting that May is the month when this happens—at least in the Prescott area. The fact that our two pyros were a male and female adds to the probability of May being the month. The size and secretive nature of this coveted species of snake has proven impossible to gather anything but the most rudimentary natural history aspects on them. Content we were just to find them, and all too soon, it was time to release them. The caprock was replaced exactly as found, to the highest standards of regard for the well-being of its occupants. We all felt the surge of joy that follows any release process. Watching both snakes slide under the caprock was a clear sign that it was time to quit (Figure 16).

It wasn't going to get any better than this!

Epilogue

This author first learned of the *cerberus* dens discussed in this narrative in April of 2006. They were discovered by a small group of field herpers who were disgruntled with the effects of research-driven science being conducted at other *cerberus* dens in the region. They made a pact before they even started searching, and held fast to their promises to each other once they started to score. Rather than move in with snake tongs, tubes, needles, microchips and all the other paraphernalia associated with the hard science aspects of aggregate rattlesnake den studies, they agreed that they would view any dens they found as if an imaginary pane of glass existed between them and the occupants. That meant that instead of moving in on any snakes viewed in dens, they would take a step back. They did not manipulate or pose any of the rattlesnakes viewed, but rather, tried in as unobtrusive manner as possible to get in situ photos of what they were seeing. A very short while after the dens were discovered, John Slone and Marty Feldner were invited to take a look. Both John and Marty agreed to their terms of hands-off and subsequently were led there. Hence, our two guides came in with the second load of bricks, so to speak. On their first visit out, it was Marty who discovered “Caprock Den.”

During the course of their visits to these dens, they began to

get images of these highly tolerant snakes doing *far* more than just filling crevices or lying outside the entrances looking pretty. It became increasingly clear to them that they were witnessing social interactions between individuals that are just now beginning to see the light in literature. We speak of things like mother snakes gathering their neonates like a mother hen might gather her chicks, or dominant male snakes sometimes coiling among the neonates to perhaps keep watch over them while their mother hunted.

But these guys all had steady jobs that kept them from going to the dens often enough to really get a handle on what they were witnessing. What was needed was somebody who could babysit these dens on a regular basis, and start documenting some of the extraordinary things they were observing. Eventually, John and Marty approached the team of Melissa Amarello and Jeff Smith as potential babysitters of the dens. They could not have possibly made a better choice, as Melissa was working on her master's degree on various other aspects of *cerberus*, and Jeff is a driven herpetologist with just the right amount of patience for sitting motionless for long periods of time to observe slow-developing behaviors. Both agreed to the terms of non-disturbance, and were soon involved with watchful and intensive observing of what was transpiring at these dens. They took it a step further by setting up time lapse cameras at these dens, and this effort in turn yielded many previously undocumented behaviors. (As these words are written, a book called *Rattlesnakes of Arizona* is in press. The book will highlight much of what has come from these particular dens, as well as others. There are many surprises contained regarding the social aspects of many species of rattlesnake in this upcoming masterpiece).

Earlier in this narrative, the reader will see these words: "My hat goes off to the people who found this place, and I have nothing but the utmost respect and admiration for their stoic willingness to keep it pristine. Had the wrong people found it, it would have been decimated many years ago." These words are heartfelt, and sincere. Nine years after these dens were first discovered, the place continues to be as good as the day they found it. Restraint on their part allowed us to see what we saw here. And this author knows that the Big Windy contingent showed the same respect for this place as did the people who first discovered it.

But this narrative has mostly been an article about a group of fun-loving field herpetologists seeking and finding pyros. The astute reader will have noted that there were no imaginary panes of glass between us and them. It was your basic all out grab-fest! This author confesses that he was dubious about, yet more than willing, to participate in the proceedings. But how much harm was done in the process?

Less than a week after the strong finish of the Big Windy Pyro Caper, Marty led another group to the same areas that he helped to lead us. Armed only with verbal directions from this author, (I did not GPS the location), he was able to find that same double pyro crevice/caprock that Gerry had found. Both pyros were still there. When I inquired as to how he knew that he had found the exact same shelter as we had, he laughed and replied: "Because there were some chopsticks still in one of the crevices."

There was no hot surge of joy running up and down my spine regarding the carelessness of our decorating the inner workings of a pyro crevice with Asian eating utensils. But the fact that the pyros remained there after being temporarily removed for photos speaks volumes for a no harm, no foul scenario. This surprised me somewhat, but it was a pleasant surprise. And however careless leaving the chopsticks may have been, there can be no mistake about whether or not Marty had the right spot.

No, happily we left nine pyros behind with this adventure. Because of this, we know that there are at least nine pyros to be found if we ever follow our own footsteps again. We know the location of each and every crevice that they live in. We know that if we ever go back, the odds are good that they will still be there—or someplace nearby. And they will still thrill us as much as when we found them the first time. Maybe even more—because we will know that we showed some restraint with our first visit. We took only pictures, and left only footprints. Well, er uh, not to mention leaving nine pyros and a set of chopsticks!

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

ReptileFest 2016 will happen on April 9 & 10

New location: Northeastern Illinois University

You know you missed it. Be there!

What You Missed at the September Meeting

John Archer
j-archer@sbcglobal.net

There was a time when I really wasn't interested in taxonomy. It seemed a boring subject filled with useless debates about meaningless distinctions. Admittedly the seemingly constant changes that take place are still annoying, but I've come to appreciate the value of the correct name and place for a particular species. I'd be hard pressed to articulate that value, however. Steve Sullivan has no such problem. Steve is a long time member and former board member of your society. He is the curator of urban ecology at our host museum, the Peggy Notebaert Nature Museum, and acts as an invaluable liaison between that institution and your society. He is a well-rounded and knowledgeable naturalist, with talents in many areas, including taxidermy, and he is constantly asking questions and pursuing new goals. He is well known by the local media and frequently appears on TV, radio and in print explaining local nature subjects and touting his citizen science program, Project Squirrel. You should have a look at that website at projectsquirrel.org. It's a fun way to get involved in a science project.

When we first approached Steve for a talk, he thought he might focus on Howard K. Gloyd, eminent herpetologist and former director of the Chicago Academy of Sciences. Steve thought a talk about Gloyd's many accomplishments would make an interesting presentation, but his initial research led him to take another tack. He titled his talk "The Foundation of Everything You Know about Nature: The Methods of Howard K. Gloyd and Other Post-Linnaean Adventurers," and he talked about "taxonomy, natural historians, specimen collections and the other esoterica that form the basis for our knowledge about nature." Not a subject that one wants to leave in an amateur's hands. Fortunately Steve is perfect for the job.

At the start he led us through the whys of taxonomy. Pictures of corn snakes and bee mimics appeared, building a case that we need a way to distinguish one animal from another. If we don't know what we are seeing can we know how to interact? Steve mentioned a pet market in Thailand where a dealer was free handling a mangrove snake without concern. Mangroves are rear-fanged, mildly poisonous snakes unlikely to be deadly but nevertheless potentially harmful. Ignorance can be anything but bliss. One needs to know mushrooms before collecting and eating wild mushrooms. Many plants and animals resemble other plants and animals and the differences matter. A bright green snake found in Illinois is very different from a bright green snake in Africa.



Steve Sullivan shows preserved specimens from the collection of the Chicago Academy of Sciences to Dr. Robert Jadin. Photograph by Dick Buchholz.

Early intellectuals recognized the importance of describing and differentiating everything. Indeed, while a picture of Adam and Eve with the snake hung on the screen, Steve said the first humans named things and also happened to be herpetologists. Aristotle took a stab at developing a system of organizing, exploring what works by asking what could be used to lump things. Color? Shapes? But our system of organizing began with "a rich old guy" named Linnaeus. His influence cannot be overstated. He devised the taxonomic system we still use, and while changes have been made, a better system has not been proposed. Roughly dividing everything into animal, vegetable, or mineral, Linnaeus proposed a framework

of kingdom, class, order, genus, and species categories that led to our binomial system of distinguishing organisms.

Linnaeus's system caught on because it works. As one progresses from kingdom to species fewer and fewer animals are included until only animals very alike are included in one group. Genetic studies are finding that evolutionary relationships work equally well within this environment, and more often than not are confirming relationships based on morphologies looked at very early on. Arguments happen at the species level, and sometimes at the genus level, but rarely above. Some of the scientific names coined by Linnaeus in 1758, such as *Caecilia tentaculata* for a species of caecilian, have never been changed. Other, more recently described species, such as *Opisthotrophis praemaxillaris*, an aquatic Southeast Asian snake, have undergone frequent name changes. Steve mentioned that the complete scientific name is genus, species, author's name, and date of description because of these types of debates.

But one can't name what one doesn't discover, so Howard K. Gloyd comes into the picture here. A picture of a dashing gentleman in boots, hat, and bow tie showed Gloyd in the field, while a photo in the lab showed him looking studious in glasses and suit leaning over a cluttered desk in a cluttered lab. Steve made the point that species description is often many hours in the field and many hours in a lab, and Howard K. Gloyd exemplified the ideal taxonomist, first finding the creatures in the field and then doing the detailed analysis required to describe a new species. Gloyd was one of those taxonomists who insisted on detailed morphological comparisons, including scale counts and reproductive organs, before designating a species. As such his work has been an important addition to the field of herpetology.

Steve then moved on to where newly discovered species should wind up—in a museum. The first described specimen of

a species is called the holotype and it is used to determine the status of all the other specimens of that species. Holotypes are protected and rarely displayed because of their importance. That specimen is the gauge for all others, and should arguments arise, often the holotype is used to resolve them. He delved a bit into how specimens are preserved (non-denatured alcohol is important) and labeled (non-dissolving ink is important). Museums have thousands of specimens sitting on shelves stored in different ways all meant to carefully maintain the specimens in as pristine condition as possible. Steve admits that many of those

specimens will not be used for long, long periods of time, but museum specimens are used for ground-breaking science and are now used in ways that could not be foreseen even 20 years ago. Museums hold the specimens in public trust so that future scientists may find uses that we cannot anticipate today. And of course, museum specimens are all that remain of some animals.

Steve's talk covered more ground than I can cover here, and with more wit and grace than I can convey. It always amazes me when I think about it that I get to associate with people the caliber of Steve through the Chicago Herpetological Society.

Unofficial Minutes of the CHS Board Meeting, September 18, 2015

President John Archer called the meeting to order at 7:45 P.M. Board members Rachel Fessler, Ed Huether and Aaron LaForge were absent.

Officers' Reports

Recording secretary: Minutes of August 14 board meeting were read and corrected. The corrected minutes were accepted.

Treasurer: Andy Malawy reviewed the report. He has added a new category to the chart of accounts—Petty Cash/Show Fund. A running tally will be kept.

Membership secretary: Mike Dloogatch read the list of expiring memberships

Sergeant-at-arms: Dick Buchholz reported 37 in attendance at August meeting.

Committee Reports

Shows:

- Notebaert Nature Museum, first full weekend of each month.
- Pullman Animal Blessing, October 3.
- NARBC, Tinley Park, October 10–11.
- Not So Creepy Crawlers, Lake Station, Indiana, October 23.
- Creatures of the Night, Garfield Park Conservatory, October 31.
- SEWERFest, November 8.

Dick Buchholz is happy with participation at shows. The Chatham back to school event went well. The organizers do other events and may be interested in having CHS there. Dick is in contact with them. Bob Bavirsha attended the Westmont Pet Expo and they gave CHS a donation.

Junior herpers: 35 attended this month. Theme was arboreal herps. The new format had several stations the kids could rotate through. Received good feedback from parents. Kim Klisiak and Frank Sladek helped out. Trying to find a role for some of the younger teens. It was suggested that some could help with Herps of Illinois at ReptileFest. Theme for October meeting is camouflage.

Old Business

ReptileFest: John Archer met with Bill Bavirsha to get details of all of the things UIC provided. Details for next year at NEIU still being worked out. Pam Bavirsha will act as guard for loading and unloading exhibits in the parking lot/loading area.

Symposium 2016: John is in contact with someone who can help find a hotel to host the event. We still need someone to take charge of the event.

Storage: John has a copy of the title to the trailer. He is working on getting an addendum to the insurance policy.

New Business

The Notebaert Nature Museum is instituting a new protocol for managing situations with escaped animals. This applies only to shows the CHS does at the museum. Mike Dloogatch moved that John be reimbursed up to \$30 per person for any expenses incurred to reward museum staff who helped find the missing animal. Motion passed unanimously.

Steven Snow, a CHS member from Missouri wants to start a herpetological research station on his property. He asked permission to use the CHS patch design without the name on it. The logo has been changed enough so that it does not look exactly like the CHS logo. There were no objections.

John Archer emphasized that if anyone wants to do a show under CHS auspices they need to contact the president or show chairman beforehand.

Herp of the Month: Nothing has been done for several months. Brandon Ottolino offered to get it going again.

The meeting adjourned at 9:00 P.M.

Respectfully submitted for the recording secretary by Teresa Savino

Advertisements

For sale: **highest quality frozen rodents.** I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , \$25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), \$27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , \$30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), \$35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: Standard 24" Neodesha reptile cages, 3 × 6" vent on top, tempered glass front. Like new condition, no burns or stains, original glass. These cages do not have the dam (horizontal molding that crosses the entire front width of the cage, used to hold back bedding material)—easier to clean without the dam. About 20 currently available, \$45 each. Linda Malawy, (630) 717-9955, linda_malawy@hotmail.com.

For sale: High quality, all locally captive-hatched tortoises, all bred and hatched here in the upper Midwest. Baby leopards, Sri Lankan stars, and pancakes usually available, and are all well-started and feeding great! Leopards are \$125 ea., Sri Lankans (2012 hatched) \$475 ea. And Pancakes are \$195 ea. Leopards for out of state sale/shipping require a veterinary health certificate (inquire for cost). E-mail at KKranz1@wi.rr.com or call Jim or Kirsten at 262 654 6303.

Herp tours: **Costa Rica herping adventures.** Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http://hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

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News and Announcements

2016 CHS HERPETOLOGICAL GRANTS PROGRAM

The mission of the Chicago Herpetological Society is education, conservation and the advancement of herpetology. To further this mission, the CHS provides grants of up to \$1,000 in the following categories:

1. Illinois Herpetology
2. Graduate Student Research in Herpetology
3. Undergraduate Research in Herpetology
4. Conservation
5. Captive Management, Husbandry and Propagation

The number of grants awarded in each category will depend on the grant applications received; it is possible that not all categories will receive awards and some categories may receive more than one award. The Grants Committee reserves the right to reassign the category under which a given proposal is submitted.

To qualify for a grant, the applicant must be a member of the Chicago Herpetological Society as of December 31, 2015. In accepting a grant, the recipient agrees to acknowledge the Chicago Herpetological Society in any publications or public presentations of research funded by this grant. Further, the recipient agrees to abide by all state and federal laws.

Recipients must submit a short report of their research findings to the CHS within 6 months of their anticipated completion date. The report should be written for a general audience and be suitable for publication in the CHS *Bulletin* or on the CHS webpage. This requirement may be waived if results will be published in a peer-reviewed journal within a year. Recipients may be invited to present a program at a CHS general meeting.

Applications must include the following:

1. Project title
2. Applicant's name, address, phone and email
3. Submission category
4. Introduction—Provide background for the proposed work. Include a clear statement of the objectives of the proposed work.
5. Materials and methods—Describe the study site and the materials and methods (in non-technical terms) that will be used to accomplish the objectives of the proposed research. Attach plans, diagrams and maps as necessary. Indicate whether you have an approved Animal Care (IACUC) protocol covering the proposed methods or whether you will be submitting such a protocol.
6. Applicability and broader implications—How does this work apply to conservation, education and the advancement of herpetology?
7. Budget—Indicate the budget for the entire project and make clear what portion the CHS grant money would fund.
8. Anticipated completion date for the research
9. Applicant curriculum vitae
10. Letters of support—Student applicants must include a letter of support from a faculty advisor. For non-academic individual and institutional applicants, letters of support from collaborating partners or institutions are strongly encouraged. Letter(s) of support may be emailed and should include an address and phone number at which the writer can be contacted. Letter(s) of support may also be sent by postal mail.

Proposals should be submitted as email attachments. Attachments should include the applicant's name in the file name. Proposal text should not exceed five double-spaced pages (excluding literature cited, applicant's CV, and letters of support) and should be typed using a common font (e.g., Arial, Times, Courier) no smaller than 10pt. Applications must be received by December 31, 2015, and awards will be announced by February 15, 2016.

Proposals should be emailed to grants@chicagoherp.org

Questions should be directed to grants@chicagoherp.org

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, October 28, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. Matthew Allender**, assistant professor at the University of Illinois College of Veterinary Medicine, will speak about his research on diseases of Illinois box turtles.

The November 25 meeting will include the annual election of officers and members-at-large of the CHS Board of Directors. **Gavin Brink**, a graduate student at Northern Illinois University, will speak about *poisonous* snakes.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, November 13, 2015, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

BROOKFIELD ZOO TRIP! SATURDAY, NOVEMBER 21, 10:00 A.M.

We will have a private tour through three houses at the zoo that maintain reptiles and amphibians. Each building visit will be approximately 30–45 minutes.

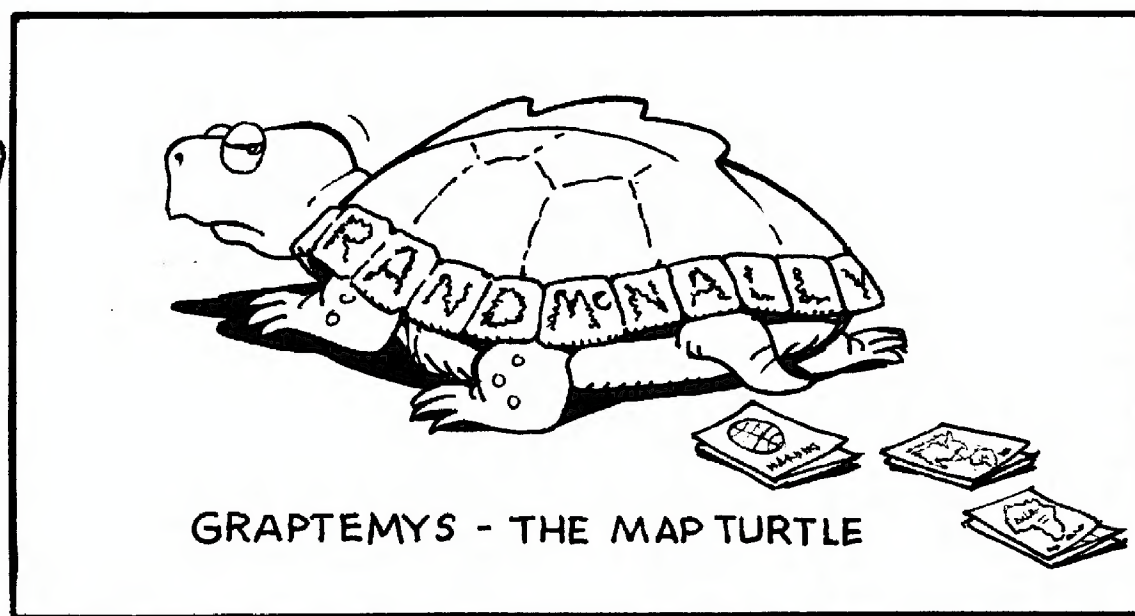
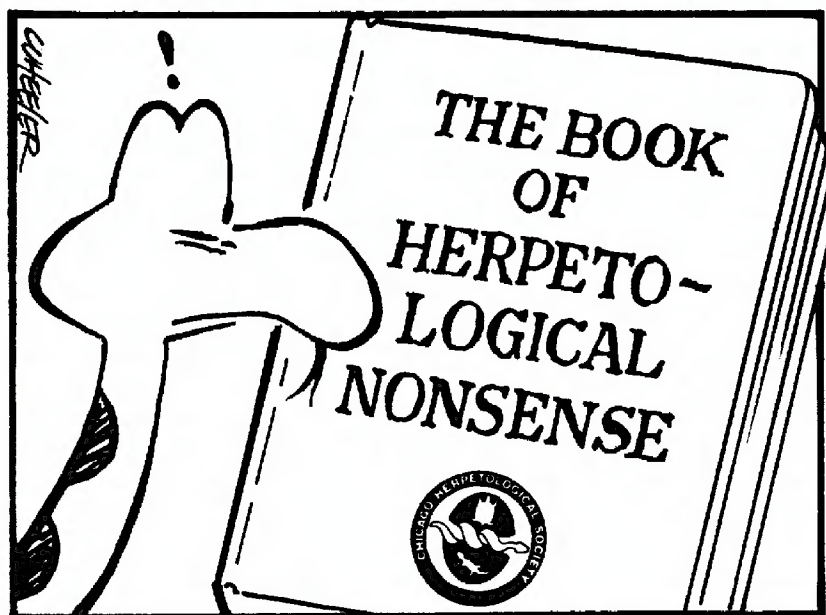
To participate you must be a paid-up member of the CHS. If you bring your family, you must have a Family Membership.

Sign-up for this event is necessary. Please contact Linda Malawy at 630-717-9955.

There will be no fee for parking or entrance to the zoo, however a complete list of attendees must be given to zoo officials by November 14, 2015. Parking attendants will have a list of preregistered CHS members eligible for free entrance. No name to Linda by November 14, and you will not be granted free access.

After the tours, members are welcome to stay and enjoy the zoo for the day.

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